

Smart Charging, interoperability standards:

....and what it means...



November 19, 2014
VGI
California Energy Commission

Agenda

- 1** **What is California's 'VGI' vision?**

- 2** **What is a Smart Charging standard?**

- 3** **What can the CEC do to support acceleration toward our vision?**

Our Vision: A future where

- > any PEV owner can safely plug in (Level 2) anytime and anywhere and be dispatchable as a certified resource
- > that helps system operators maintain reliable service while achieving our State RPS and GHG reduction goals
- > seamlessly without confusing the consumer
- > or impacting their transportation needs
- > in a way that lowers their total cost of ownership.

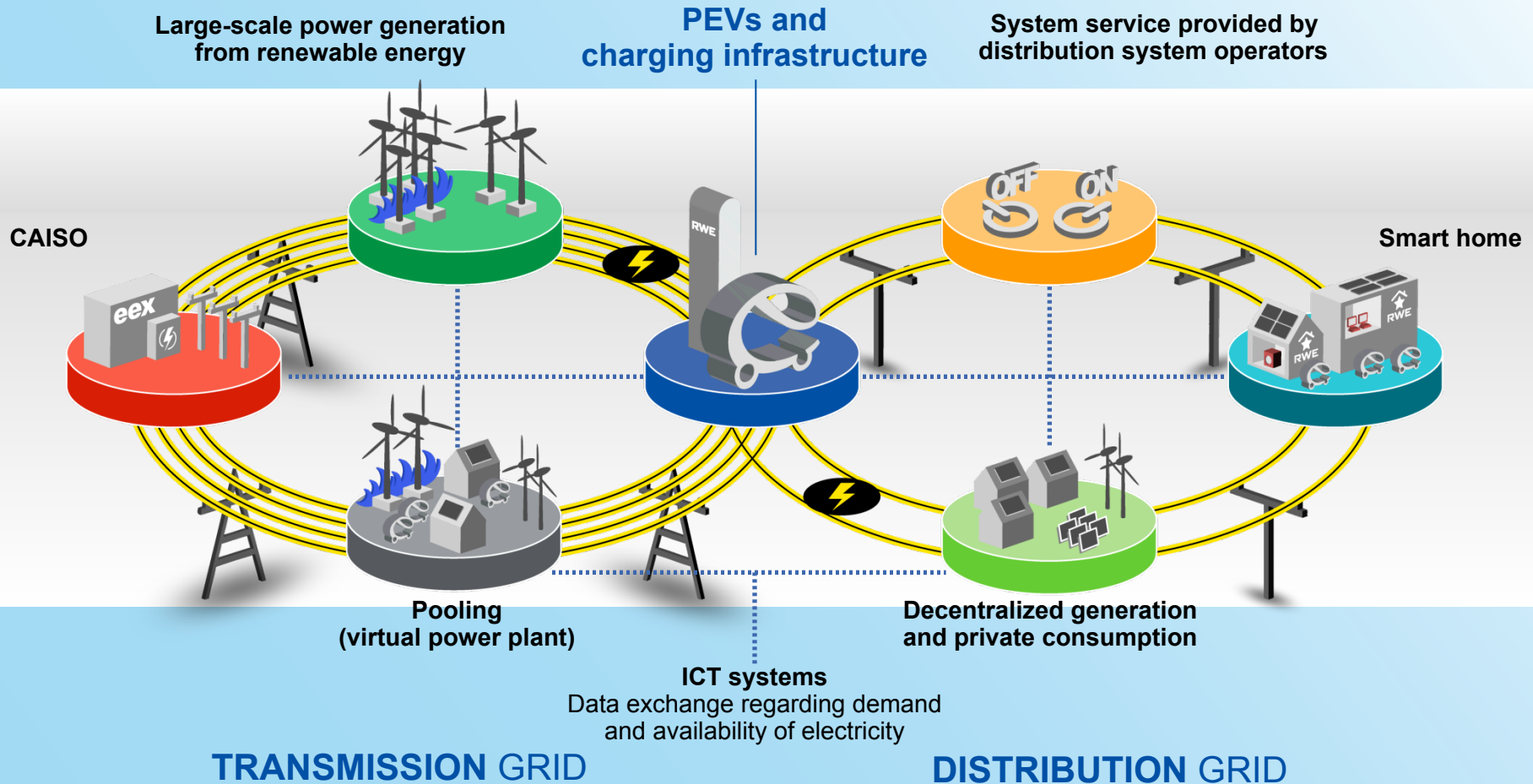


“When’s the best time to plant a tree?”

T. Boone Pickens

FOR THIS TO HAPPEN QUICKLY, WE NEED TO PLANT THE SEEDS NOW

(1) - AC Level 2



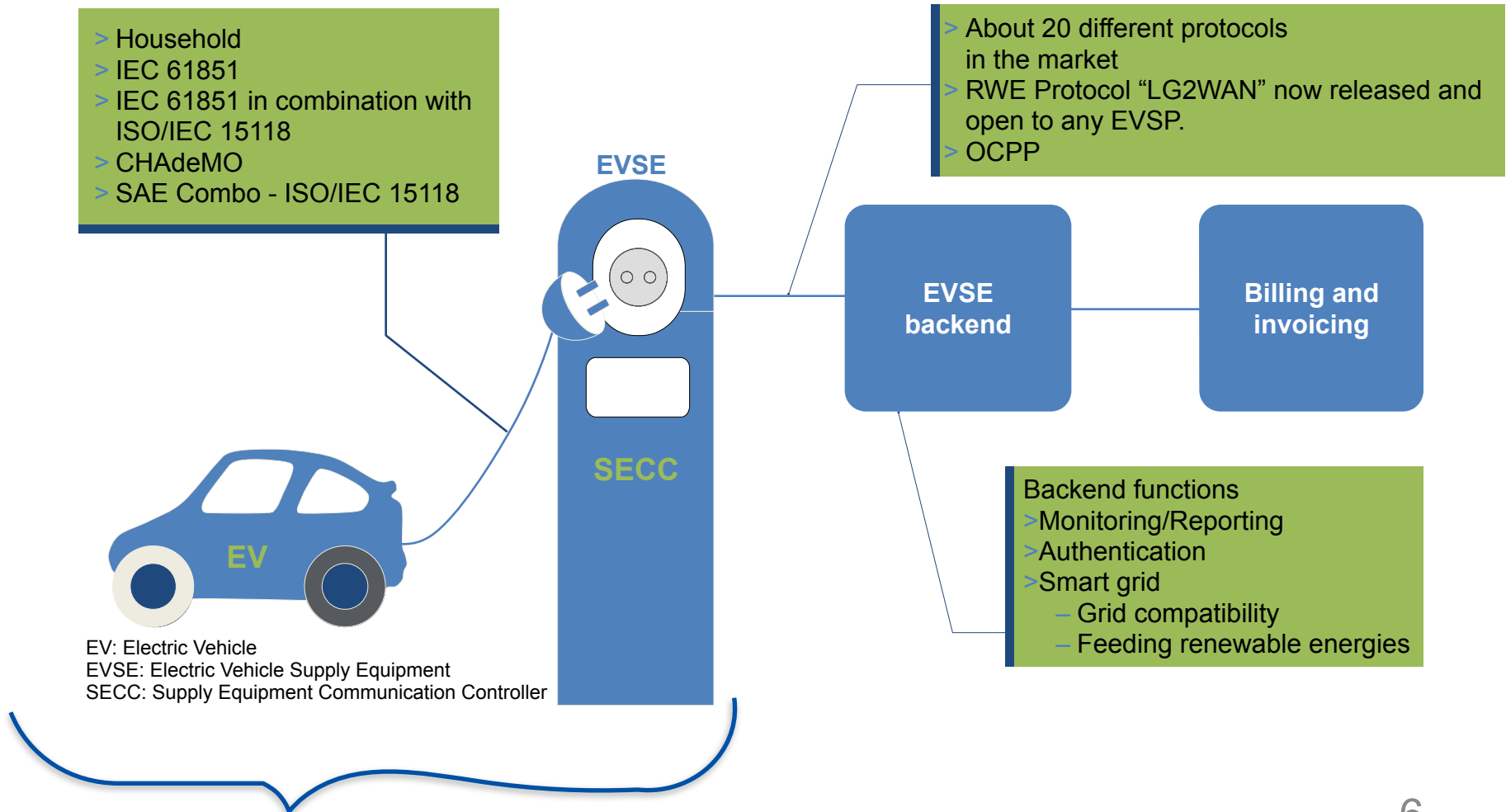
Agenda

- 1 What is our vision?

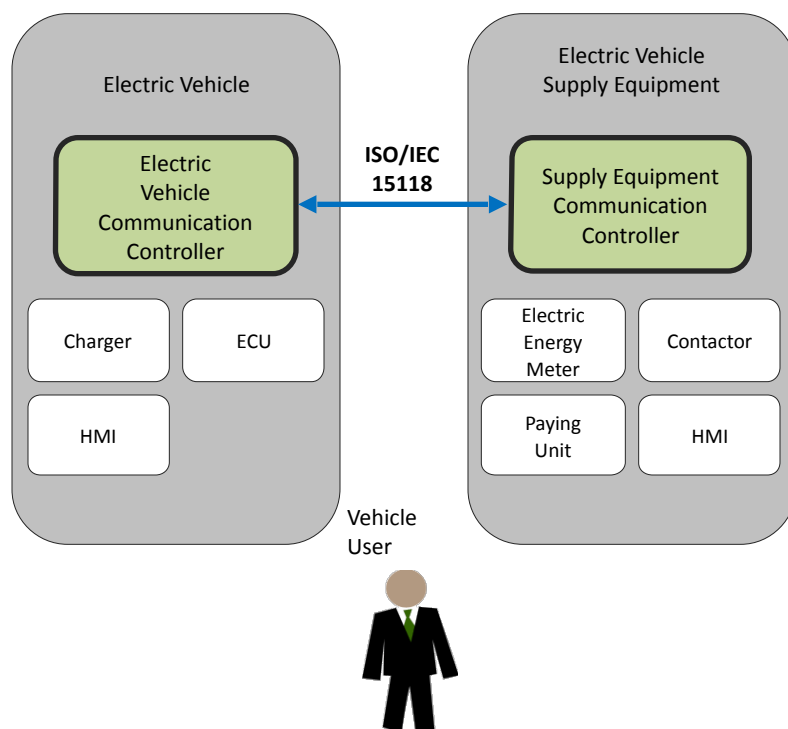
- 2 **What is a Smart Charging standard?**

- 3 What can the CEC do to support acceleration?

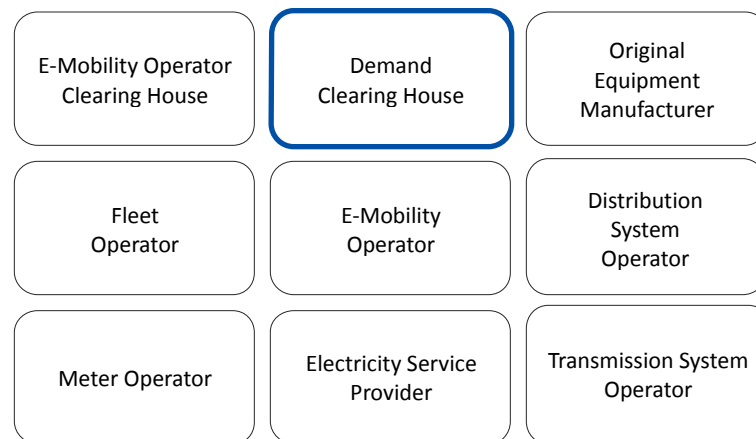
Where does smart charging begin and end?



Primary Actors



Secondary Actors



How does a 'Demand Clearing House' work?

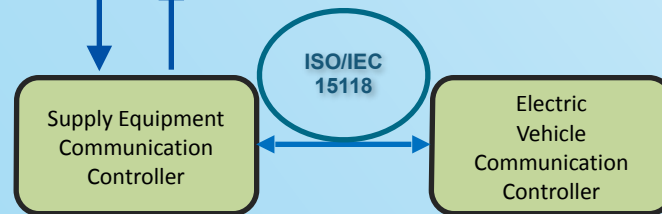
Local Utility (or other "Secondary Actor") sends information to the DCH

Demand Clearing House
(agnostic to utility protocol)

Sample proposed grid profile:
contains available power & prices in
following CSV format:

DemoTariffTable;
1;TARIFFID_1;Standard;
0,0,0;32;22000;100%;
0,15,0;32;22000;50%;
(32A starting from Sunday Morning 0.00
for 100% of the costs; 32 from 15.00
(3p.m.) Sunday, at 50% of the costs)...

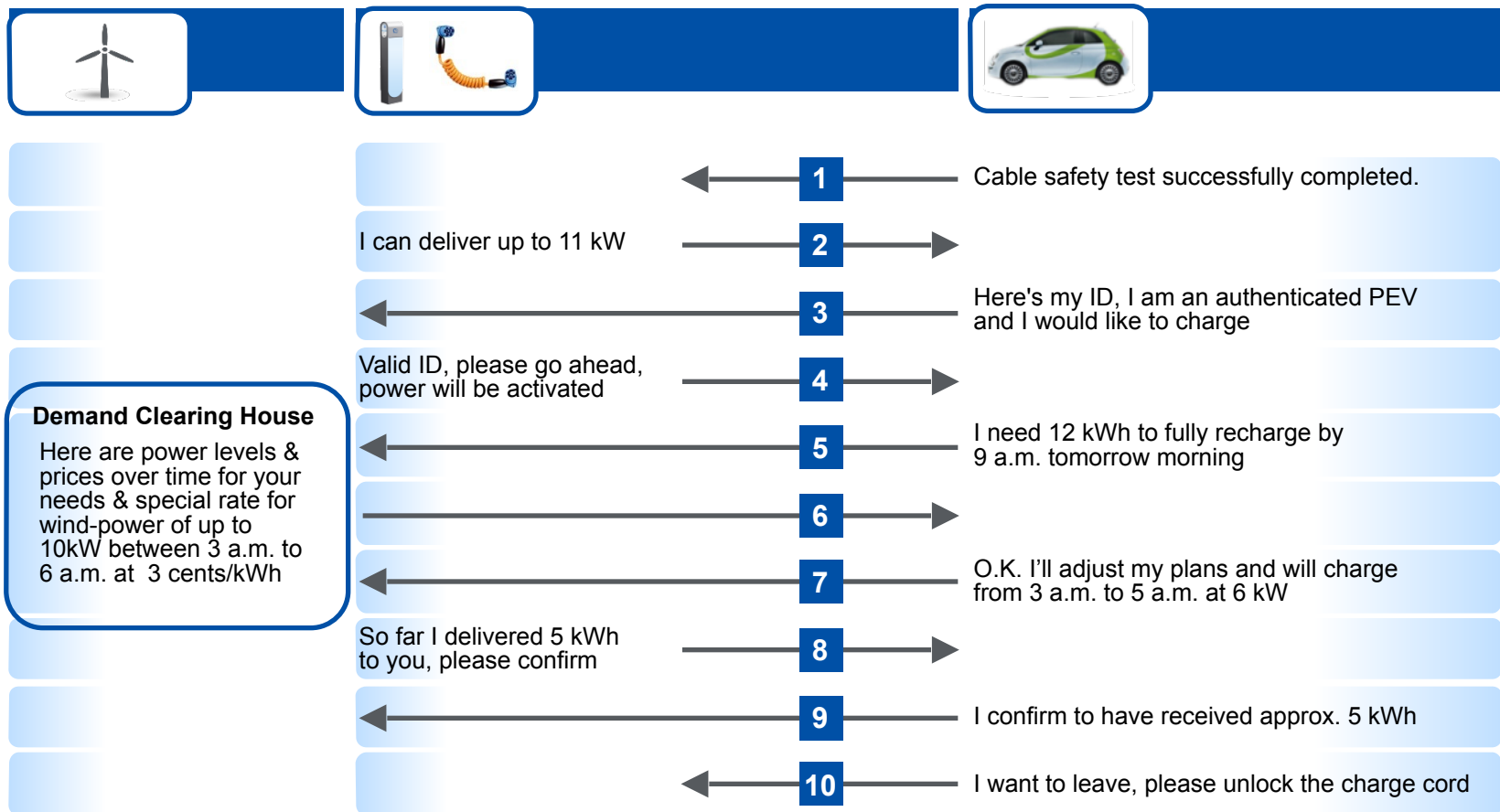
- Prices over next 24 hrs
- Renewable Energy & Other Power plant info
- Load forecast - Transmission & Substation
- Load forecast - Distribution & Substation
- Load forecast - Transformer & other EVCC Grid Profiles
- Consolidate to Grid Profile and Propose to SECC/EVCC



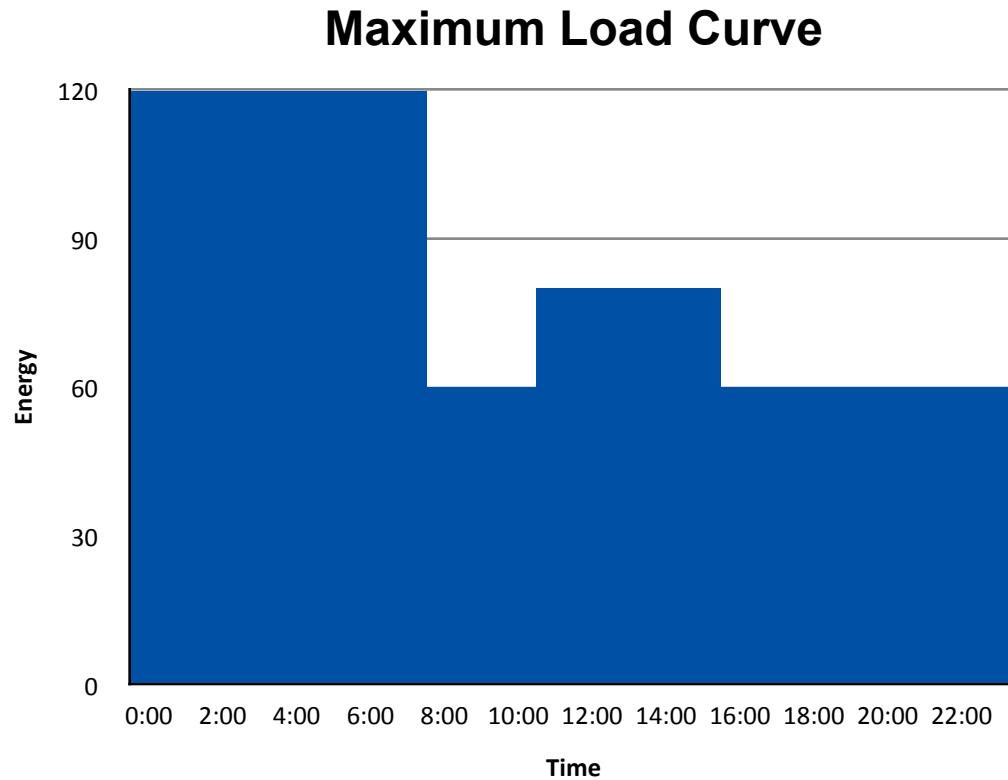
Intelligent infrastructure – through standards

Smarter...Faster...Simpler...for the consumer

EXAMPLE JOINT DEVELOPMENT OF DAIMLER AND RWE ISO / IEC 15118



Maximum load curves per time can be defined in a flexible way

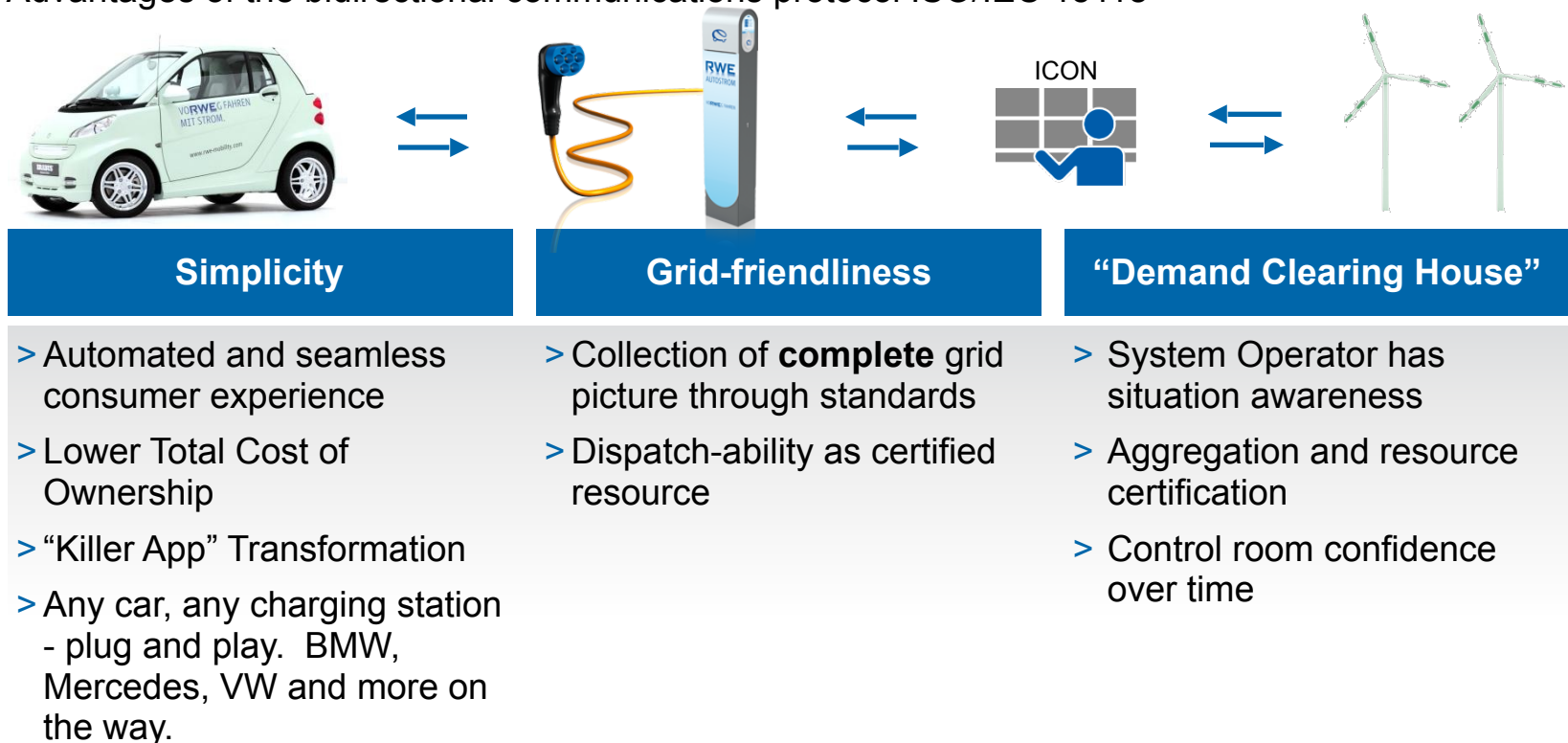


Key Characteristics

- > Minimum time gap between two limits has to be 15 min
- > Interface for external data (e.g. PV supply) is defined as a Web-Service
- > Preferred charging, if renewable energy is available

UCSD Pilot: Smart cars connecting to smart chargers run by a smart grid: leads us where we want to go.

Advantages of the bidirectional communications protocol ISO/IEC 15118



Agenda

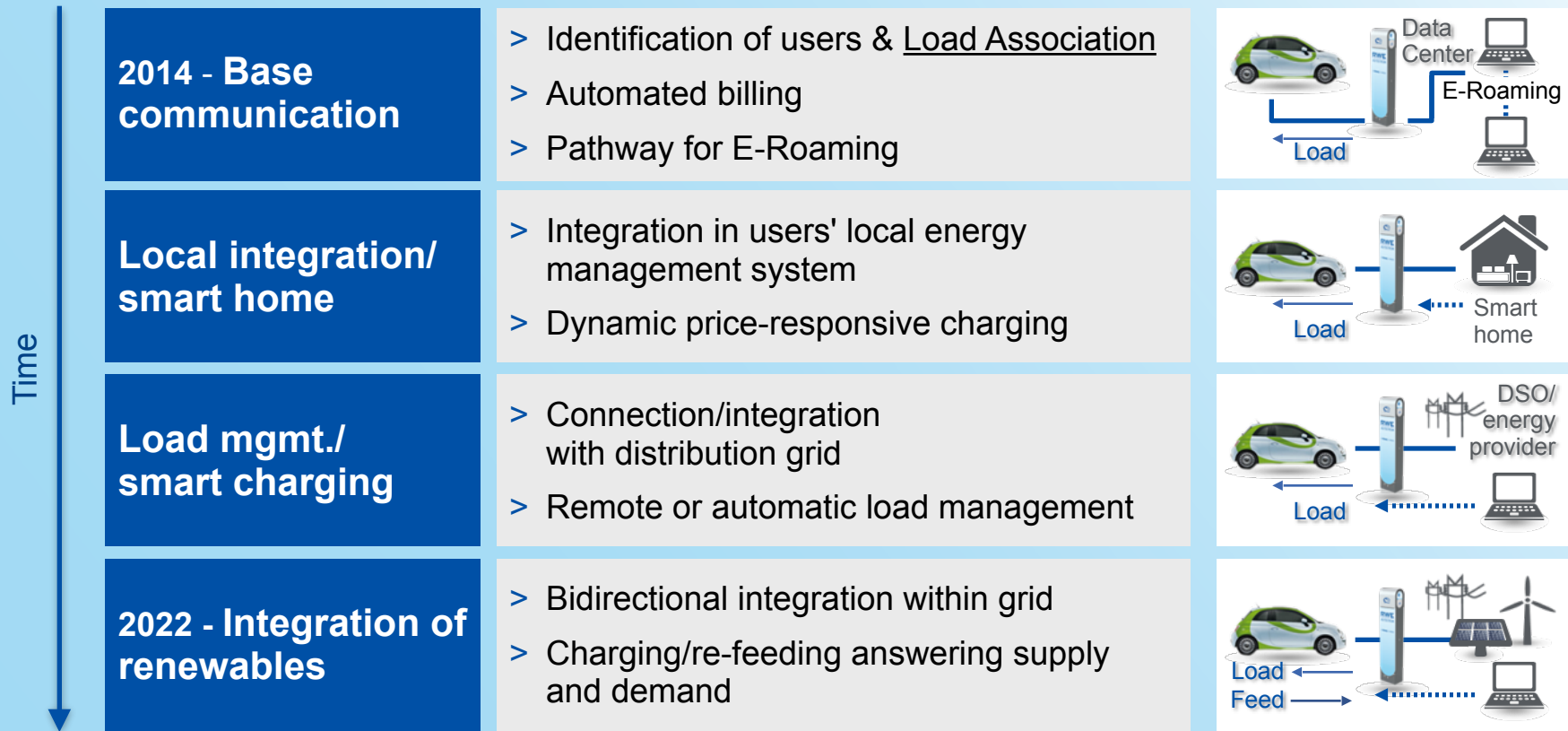
1 What is our vision?

2 What is a Smart Charging standard?

3 **What can the policymakers do to support acceleration?**

- Move Step-wise toward increasing complexity. Lay the foundation, and build scale working with the utilities and the CAISO.

PLANT THE TREE TO ENABLE GROWTH NOW



Deployment of smart grid along side with E-Mobility

DSO: Distribution System Operator

V2G: Vehicle-to-grid



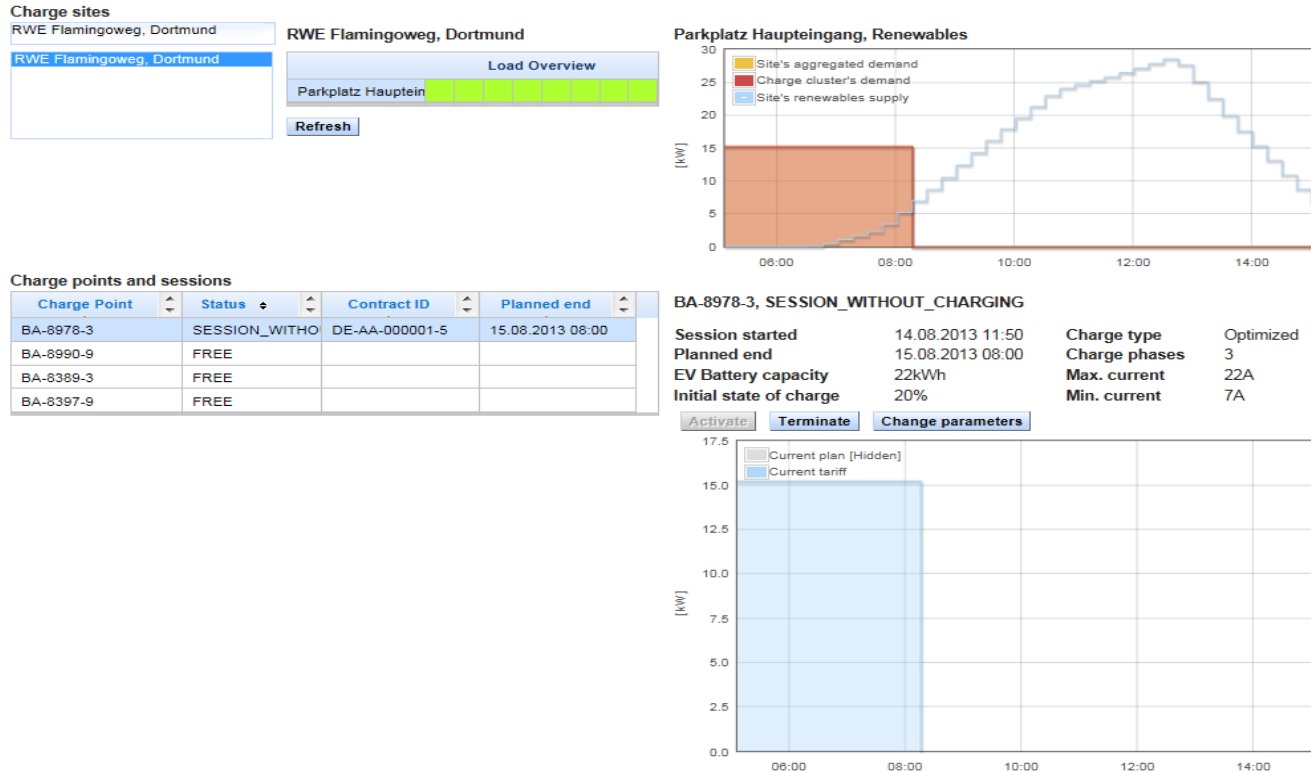
energy flow



control flow

Demand Energy Management “DEM” solution

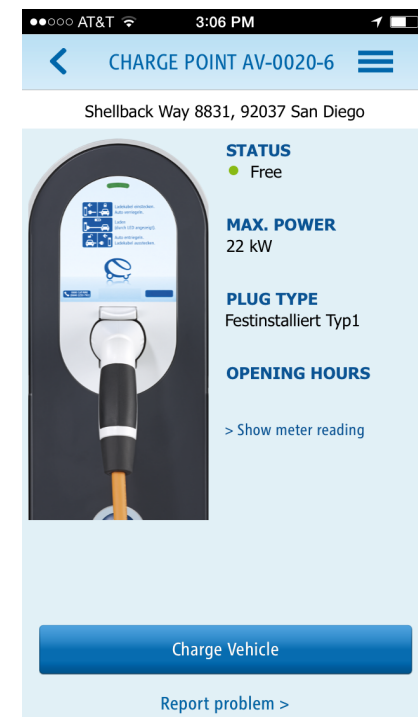
Energy Management Dashboard



Functionalities for Use Cases

- > Static load management can be done by definition of static supply / load curves for clusters of chargers
- > Dynamic load management possible by interface to external source, e.g. for predictive solar production
- > Enables demand-charge management

Thank you!



Schedule EV-TOU - DOMESTIC TIME-OF-USE FOR ELECTRIC VEHICLE CHARGING is specific to the charging of electric vehicles where the charging facility is separately metered . Effective 8/1/2014

SCHEDULE EV-TOU										Schedule DWR-BC Rate	Schedule EECC + DWR Credit Rate	Total Electric Rate
Energy Charges (\$/kWh)	Transm	Distr	PPP	ND	CTC	LGC	RS	TRAC	UDC Total			
Summer												
On-Peak	0.01861	0.08469	0.01178	0.00044	0.00140	0.00027	0.00029	(0.00782)	0.10966	0.00513	0.37129	0.48608
Off-Peak	0.01861	0.08469	0.01178	0.00044	0.00140	0.00027	0.00029	(0.00782)	0.10966	0.00513	0.09705	0.21184
Super Off-Peak	0.01861	0.08469	0.01178	0.00044	0.00140	0.00027	0.00029	(0.00782)	0.10966	0.00513	0.04787	0.16266
Winter												
On-Peak	0.01861	0.08469	0.01178	0.00044	0.00140	0.00027	0.00029	(0.00782)	0.10966	0.00513	0.09536	0.21015
Off-Peak	0.01861	0.08469	0.01178	0.00044	0.00140	0.00027	0.00029	(0.00782)	0.10966	0.00513	0.08375	0.19854
Super Off-Peak	0.01861	0.08469	0.01178	0.00044	0.00140	0.00027	0.00029	(0.00782)	0.10966	0.00513	0.06059	0.17538
Other Charges/Discounts												
Metering Charge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Minimum Bill	0.000	0.170	0.000	0.000	0.000	0.000	0.000	0.000	0.170			0.170
The total rates presented reflect the UDC rates associated with service under Schedule EV-TOU and the generation rates associated with Schedules EECC and DWR-BC. The UDC rate-by-rate components presented are associated with service under Schedule EV-TOU as presented in the utility's tariff book. The TRAC charge includes the Residential Volumetric Rate Adjustment as described in Schedule GHG-ARR.												